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UNIVERSITY OF ALBERTA

An Economic Analysis of Sustainable Forest Management on Farm Woodlots in Saskatchewan

by

FIONA J. SALKIE

A THESIS SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE

IN

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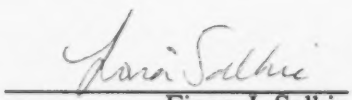

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Date: September 17, 1993

ABSTRACT

The recent development of new processing facilities in Meadow Lake, Saskatchewan has created a long-term market for timber in the region. Although these processing facilities are currently supplied by crown timber reserves, increasing pressure on public forest resources from multiple users has caused processors to consider private woodlots as a supplemental source of fibre. A survey was undertaken to investigate conditions under which landowners may respond to emerging demand by managing their timber resources for harvest and sale.

Survey results indicate that, although virtually no management or harvesting has occurred in the past, approximately half of those interviewed would consider timber management and harvesting in the future. Logit analysis identified landowner characteristics that were related to landowners' willingness to consider forest management and harvest in the future and the likelihood that they would consider a timber contract. Significant characteristics included: the diversity of farm operations; the length of family tenure of the land; the number of ways the respondents use their forest land; and the area of forest owned. A preferred timber contract was identified as having: a duration of 1 to 5 years; young growth established at the end of the contract term; and payments for harvesting and management services made through a crop share arrangement.

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CHAPTER 1: INTRODUCTION

Although 2.6%, or 961 000 acres (389 000 hectares), of Saskatchewan's productive, non-reserved forest land is privately owned, few markets have developed for private timber. There are small markets for firewood and rough lumber but limited opportunities for large scale fibre sales. Aspen (*populus tremuloides* Michx.) has historically been considered a "weed species" with little commercial value.

Recent technological innovations has caused aspen to become a commercially valuable species. Accordingly, a pulp mill was constructed in Meadow Lake, Saskatchewan that utilizes aspen as its primary input. This mill has created a long-term demand for aspen in the northwest region of the province. Although industrial forest products companies are allocated crown timber through Forest Management Licence Agreements (FMLA) increasing pressure from other users of the forest, such as aboriginal and environmental groups, has placed uncertainty on the long-term availability of current fibre allocations. This has caused industrial timber managers to look towards private woodlots as a potential long-term source of fibre.

A number of factors support the development of a private forest sector in Saskatchewan. Most of the privately owned forest land in Saskatchewan is owned

by farmers. Thus, the opportunity cost of labour in the winter is relatively low and diversification into woodlotting may be complementary to existing agricultural operations. Furthermore, private forests are generally located on the forestry-agriculture fringe and are accessible to transportation infrastructure and frequently in close proximity to processing facilities. Landowners growing trees may also benefit from a variety of non-timber values associated with forests.

Despite these favourable conditions, a number of factors may have impeded the development of private timber markets. Land use decisions on private land may be distorted by conflicting government policies. Market failures, including an imbalance of market power between buyers and sellers and information exchange problems may also impede the development of private markets.

Public policy may be able to correct some of these problems and influence the development of private timber markets. However, to direct policy in an optimal manner, policy makers must understand the motivations of woodlot owners, their attitudes towards various policy options, and their likely response to policy initiatives. Very little is known about woodlot owners and identifying landowner characteristics associated with an interest in timber management, harvest, and contracts may help policy makers assess and modify policies and programs.

This study was undertaken to try to fill some of the knowledge gaps about woodlot

owners. It was also undertaken to determine whether there would be an interest in developing private timber markets in the future and to investigate mechanisms that could be used to overcome some of the factors that may have impeded the development of a private forest sector.

Four goals were identified for the study. These included: 1) to identify characteristics of landowners that have motivated them to manage and supply timber in the past; 2) to identify landowner characteristics that may be related to willingness to consider timber management/harvest in the future; 3) to investigate the use of various contracts to encourage private forest management and sustainable timber harvesting; and 4) to consider the results of this analysis within the context of government policy and other factors that affect land use decisions.

This thesis first provides background information on Saskatchewan's private forest resource. Methods used in data collection and analysis are then outlined. Results from the analysis of the relationship between landowner characteristics and management and harvesting decisions are then presented, followed by the analysis of timber contract options. Finally, implications of the findings are discussed, limitations of the study outlined, and further research suggested.

CHAPTER 2: BACKGROUND

According to economic theory, individuals allocate their resources between alternative uses in order to maximize their utility. Utility may be maximized by a combination of market sales from the resource and direct consumption of the resource. If individuals derive no non-market benefits from their resources to offset the utility they gain from market derived benefits then the appropriate measure of utility maximization is rent maximization. However, when utility is gained from both market and non-market uses of the resource, rent maximization values, calculated from dollar values of resource uses, may not properly reflect landowner preferences.

In the case of private woodlot owners, utility may be composed of a combination of market benefits associated with various land use options, such as timber and cattle sales, which are readily identifiable, and income-in-kind and aesthetic services from forest land, that are more difficult to observe. Income-in-kind may include firewood and building materials for personal use, and aesthetics services may include such non-fibre items as wildlife viewing and recreational opportunities. The balance between benefits derived from direct income, and from income-in-kind and aesthetic services, will influence landowners willingness to manage and harvest timber.

There is little known about motivations of woodlot owners in Saskatchewan with regards to their forest harvesting and management decisions. Studies[1] that have been undertaken have concentrated on monetary returns to landowners and have tended to ignore nonpecuniary benefits that can be derived from private forests. If landowners' primary motivations in owning forest land are to maximize non-fibre benefits, then an unwillingness to consider harvest implies that landowners obtain more utility from non-timber benefits associated with the forest than from wood harvest and sales.

Even if landowners are interested in harvesting their wood, a number of factors may impede the development of timber markets in Saskatchewan. A variety of policies in Saskatchewan and a number of other factors may be inhibiting the development of commercial woodlot use.

A. POLICIES AFFECTING LAND USE DECISIONS

Policies ranging from the Saskatchewan Forest Act to agriculture subsides and taxation may affect decisions to harvest timber in Saskatchewan. Tenure allocation policies in Saskatchewan may provide industrial forest product firms with enough

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[1] The Farm Woodlot Association of Saskatchewan (FWAS) commissioned a report to describe and analyze NIPF wood supply in the province (Harding, 1989) and Saskatchewan Agriculture Development Fund commissioned another to investigate the potential of private forests in Saskatchewan to meet timber demand (FWAS, 1991)

public timber to supply their operations. FMLA agreements contain 'use it or lose it' clauses which encourage industrial forest processors to use all of their annual cut (FWAS 1991) and discourage them from considering alternative sources of fibre supply. Furthermore, tenure is generally allocated in such a way that industrial forest processing facilities are spatially separated resulting in the formation of spatial monopsonies. Also, tenure agreements generally require companies to establish value added processing facilities. This requirement has lead to vertically integrated forest products firms and an absence of log markets. Additionally, stumpage prices charged to the forest industry by the provincial government for crown timber, may be lower than economic rents associated with forest land. This, in combination with imperfect markets and a monopsonistic forest industry, may result in landowners being offered artificially low prices for their trees. If prices offered to landowners for their timber are insufficient to cover costs associated with timber production, then landowners will not have incentives to enter the market.

A number of agricultural policies affect land use decisions on private land. The magnitude of payouts through agricultural programs suggest that such subsidies have considerable impact on land use decisions. In 1992 gross direct payments to producers in Saskatchewan amounted to nearly $630 million or 25.07% of total farm cash receipts and net direct payments totalled almost $444 million or 65.59% of net farm cash income (Statistics Canada, 1993).

Agricultural subsidies discourage farm woodlot development for a variety of reasons. Programs such as the Gross Revenue Insurance Program (GRIP) may induce planting into GRIP approved crops; however, woodlots are not covered under this program. Woodlots are also not eligible for coverage under the Net Income Stabilization Account (NISA) or the Canada-Saskatchewan Crop Insurance Corporation programs because they are not recognized as a farm enterprise. Furthermore, landowners may have difficulty including woodlot income in loan applications to financial agencies such as the Agriculture Credit Corporation - Saskatchewan (ACS).

Some government programs exist which encourage woodlot management, however there size and extent are very small compared to agricultural programs. The Prairie Farm Rehabilitation Administration (PFRA) provides funding and planning assistance to help farmers return cultivated land to permanent cover. However, no one in Saskatchewan has used this program to return land to permanent tree cover (Pers. Com., R. Gaube, PFRA). Other programs such as the Save Our Soils program, Ducks Unlimited projects, and Wildlife Habitat Protection Act activities have encouraged the maintenance of forest covered lands. Natural Resources Canada, formerly Forestry Canada, through the Canada-Saskatchewan Partnership Agreement in Forestry, provides direct federal funding for extension services to assist woodlot managers, and incentive funds for forest improvements. However, although $65 932 was provided for extension services to woodlot owners in

Saskatchewan in 1992, less than $6 500 was paid directly to landowners for forest management activities (pers. com. V. Begrand, Natural Resources Canada).

B. OTHER IMPEDIMENTS TO MARKET DEVELOPMENT

In addition to current government policies, several other factors may be impeding market development. There are only two large industrial companies purchasing wood in Saskatchewan, whereas there are multiple woodlot owners with small land holdings. The small size associated with many woodlots may result in inefficiencies to both woodlot owners and timber purchasers. Landowners may not be able to achieve economies of scale in harvesting and management. Wood processors may face high transactions costs when purchasing wood from many small sellers. Information exchange problems may also impede the development of private timber markets. Given that technology has only recently made aspen valuable, woodlot owners may be unaware of potential timber markets and may not have the knowledge required to manage their forests. Wood processors may not know of woodlot owners who are interested in selling fibre.

C. EXPECTED RESULTS

A number of studies have investigated landowner characteristics that are associated with management and harvesting activities. A diffusion of innovations

model was used by Straka and Doolittle (1988) to explore the relationship between landowner characteristics and the decision to regenerate after harvest. Greene and Blatner (1986) used discriminant analysis to identify characteristics associated with the decision to manage timber by woodland owners in Arkansas. Dennis used probit (1990) and tobit (1989) analysis to estimate the relationship between timber harvest in New Hampshire, and characteristics of owners and their forests. Carlen and Muller (1985) used a probit model to study factors influencing the private forest owner's decision to cut timber in Sweden.

Logit analysis has been used in several studies to investigate the relationship between landowner characteristics and timber supply. Binkley (1981) developed a timber supply model for New Hampshire, Romm et al (1987) investigated the relationship between forestry investment and landowner characteristics in northern California, and Jamnick and Beckett (1987) examined timber harvests on private land in New Brunswick. Hyberg and Holthausen (1989) used logit analysis to test whether landowners in Georgia seek to maximize profit or utility, a function of both income and nonpecuniary benefits. Messmer et al (1990) studied past harvesting behaviour by landowners in Alberta. These past studies along with economic theory suggest a number of variables could be significant in this analysis.

1. **Expectations on past timber management and harvest and willingness to consider future timber management and harvest**

Based on previous studies a number of landowner characteristics were expected to influence past management and harvesting activities and future intentions including: total area of land owned; area of forest owned; the distance between the respondent's residence and his/her forest land; the length of tenure by the landholder's family; the level of diversity of the farm operation; the ways in which the respondents use their forest land; age; and education.

Economies of scale associated with larger holdings were expected to result in a positive correlation between total area of land owned, and management and harvesting activity. This expectation is supported by the previous studies of Jamnick and Beckett (1988), Binkley (1981), and Carlen and Muller (1985).

Carlen and Muller (1985) and Jamnick and Beckett (1988) found the distance between the respondent's residence and his/her woodlot was negatively correlated with the likelihood of timber management and harvest. This is likely due to difficulties encountered by absentee landowners when arranging for timber harvesting and marketing.

The length of time the respondent's family had owned the property was expected

to be positively correlated to harvest. Jamnick and Beckett (1988) felt that this may be due to the increasing likelihood of historical precedent for timber harvest as the length of tenure increases. They suggest that respondents with longer tenures are more likely to have experience and knowledge of wood management and harvest techniques.

Increased farm diversity was expected to be positively correlated to timber management and harvest. Diversified farmers are more likely to have the equipment and skills that are needed for a new operation. Straka and Doolittle (1988) suggest that people who are venturesome or innovative are more likely to regenerate following harvest; increased diversification may imply a more innovative farmer.

The expected relationship between age and forest management and harvest was unclear. Binkley (1981) found age to be positively correlated to harvest; he felt that if trees are considered an investment then, as older peoples planning horizons shorten, they are more likely to liquidate their investments. Carlen and Muller (1985) found age to be negatively correlated to timber harvest; they felt that old age often leads to declining strength thus older people are less likely to harvest themselves. However they may be more likely to sell stumpage. Carlen and Muller also suggested that a desire of landowners to leave standing timber for the next generation may result in a negative correlation.

A positive correlation was expected between education and willingness to manage and harvest timber. Educated people may be better informed and more aware of opportunities.

The number of different forest uses was expected to be related to timber management and harvesting. The number of consumptive and non-consumptive uses were expected to be, respectively, positively and negatively correlated with timber management and harvesting[2]. Respondents who have used their forest consumptively may be more willing to manage and harvest their timber whereas those who used it non-consumptively may gain more utility from non-timber benefits associated with their forests than from potential revenue from their timber.

2. Expectations on willingness to enter management and harvest contracts

Siegel (1973) and Meyer (1986) point out that contracts have been used in the southern United States to encourage sustainable forest management for some time. Different contracts have been developed for management and harvesting of forests. In this study, willingness to allow someone else to manage or harvest a tract of forest was assumed to imply a willingness to enter into a contract.

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[2] Consumptive uses included lumber, firewood, grazing, bed and breakfast, and trapping. Non-consumptive uses included hunting, aesthetics, recreation, wildlife, conservation, and security for the future.

No other studies were found that related private forest owner characteristics to their willingness to enter into timber contracts. Economic theory and intuition suggested that distance, forest tract size, level of diversity, age, and prior experience would be significant in this relationship.

A positive correlation was expected between the distance from the respondents residence to their land, and their willingness to consider a timber contract. Travel would increase the costs of timber management and harvest incurred by absentee landowners causing them to be more willing to arrange for someone else to manage and harvest their forest.

Forest size was expected to be positively correlated with willingness to consider a timber contract. Respondents generally have other jobs. Thus the time commitment required to manage and harvest large tracts of timber themselves could be prohibitive.

Landowners operating more diverse farm operations are more likely to have the skills and equipment required to manage a forest thus a negative correlation was expected between level of diversity and willingness to consider a timber contract.

The physical demands associated with timber management and harvest suggested that age would be positively correlated to willingness to enter a timber contract.

Past experience was expected to be positively correlated to landowners willingness to enter timber contracts. As length of tenure increases it is more likely that the landowner had been involved in a contract arrangement in the past.

3. Expectations on contract characteristics

Contracts can generally be described in terms of five characteristics: the agency with whom the contract is entered; the duration of the contract; the method of payment for services received by the landowners; the method of payment to the landowner for the timber they sell; and the condition the land is left in at the end of the contract term. There were no *a priori* expectations in this study as to landowner characteristics that may be correlated to preferences for various contract characteristics.

D. MODELLING APPROACH

This study is intended to identify landowner characteristics that are associated with decisions to manage and harvest private timber stands. These decisions may be modelled with qualitative choice models.

Aldrich and Nelson (1984) suggest using linear probability, logit, and probit models to model qualitative choices. A number of problems are associated with

the linear probability model which limit its usefulness. Aldrich and Nelson (1984) point out that it will likely incorrectly specify a nonlinear relationship which will result in a number of problems including: no known distribution for the error term; sensitivity to the range of data; understatement of the magnitude of the true effects; systematic probability predictions greater than one and less than zero; and estimates that get worse as standard statistical tools are used to improve them. Pindyck and Rubinfeld (1981) point out that the error term is heteroscedastic resulting in a loss of efficiency. The logit and probit models yield almost identical results unless the sample is very large (Aldrich and Nelson 1984). Accordingly, the choice between the two techniques should be based on practical concerns such as computational ease, computer program availability, experience, and personal preference.

The logit model was selected over the probit for this analysis because it is computationally easier to use and the small sample size suggests that there would be little difference between logit and probit model results. A logit model was used: to analyze the decision to cut and manage timber in the past; to analyze landowners' willingness to consider management in the future; and to evaluate landowners' willingness to consider timber contracts. Multinomial logit relations were used to investigate the relationship between landowners' characteristics and their preferences for contract characteristics.

CHAPTER 3: METHODS

A. QUALITATIVE CHOICE THEORY

Utility theory suggests that given two options individuals will choose the option that maximizes their utility or satisfaction. Utility can be derived from a number of factors of which profit maximization may be only one component. People derive utility based on their preferences and motivations. Land use decisions may be made to maximize utility through a combination of benefits derived from wildlife, recreation, soil conservation, and other benefits-in-kind as well as income from commodity sales. Landowners will only elect to harvest timber if this activity is part of that combination of benefits that will maximize their total utility.

The decisions to harvest or not, or to allow someone else to harvest timber, are qualitative in nature. Train (1986) defines a qualitative choice as one in which the decision maker faces a choice between alternatives that are a finite set, mutually exclusive and exhaustive. The choice is between discrete variables and is analyzed using a qualitative choice model.

Aldrich and Nelson (1984, pp 35 - 36) develop the rational choice approach to qualitative choice models which states that individuals, given a choice between two alternatives, will select the alternative that they prefer. If W_{i1} is individual 'i's'

preference for alternative 1 and W_{i2} is their preference for alternative 2 then preferences can be described as a function of exogenous variables X_{ik} such that:

$$W_{i1} = \sum a_{k1} X_{ik} + v_{i1} \quad (1)$$

$$W_{i2} = \sum a_{k2} X_{ik} + v_{i2} \quad (2)$$

where the V_i's are random or unobservable aspects. Individual i would be expected to select alternative one when $W_{i1} > W_{i2}$. If Y_i^* is defined as:

$$Y_i^* \equiv W_{i1} - W_{i2} \quad (3)$$

then:

$$Y_i^* = \sum (a_{k1} - a_{k2}) X_{ik} + (v_{i1} - v_{i2}) \quad (4)$$

which can be rewritten as:

$$Y_i^* = \sum b_k X_{ik} + u_i \quad (5)$$

Thus alternative one is chosen when $Y_i^* > 0$ and:

$$\sum b_k X_{ik} + u_i > 0 \quad (6)$$

A variable Y_i can be defined as the observed choice and $Y_i = 0$ when $Y_i^* < 0$ and $Y_i = 1$ when $Y_i^* > 0$. One could rewrite this as a probability:

$$P(Y_i=1) = P(Y_i^*>0) = P(u_i<\sum b_k X_{ik}) \tag{7}$$

Thus in order to estimate the probability that i will select alternative one, the cumulative probability that u_i is less than $\Sigma b_k X_{ik}$ is estimated. The selection of a probability distribution for u_i determines which type of analysis is to be used. If the cumulative normal distribution is selected, then probit analysis is used. If the logistic distribution is chosen, then a logit model is used.

The logit and probit models are both nonlinear specifications that constrain estimated probabilities to between 0 and 1 without constraining the range of data (Aldrich and Nelson, 1984). The probit model is based on the cumulative normal distribution and takes the form:

$$F(Z) = \int_{-\infty}^{z} \frac{1}{\sqrt{2\pi}} \exp(-\frac{u^2}{2})\, du \tag{8}$$

The logit model uses the logistic distribution and takes the form:

$$F(Z) = \frac{e^z}{1+e^z} \tag{9}$$

The logit and probit models produce essentially the same results and can only be distinguished in very large samples. The choice between the two models is generally based on practical concerns such as computational ease, the availability of computer programs and personal preference.

Logit and probit models are used to analyze dichotomous dependent variables; a multinomial logit model can be used when dealing with polychotomous variables. Although a variety of distributions can be used to model polychotomous variables, the logistic distribution is computationally the easiest (Maddala 1983).

An assumption is made in multinomial logit analysis that $P_1, P_2, \ldots P_m$, the probabilities associated with *m* categories, can be expressed in binary form (Maddala 1983). Assuming a logistic distribution, the probabilities are[3]:

$$P_j = \frac{e^{B_j'x}}{D} \qquad (j=1,2,\ldots,m-1) \tag{10}$$

$$P_m = \frac{1}{D} \tag{11}$$

$$D = 1 + \sum_{k=1}^{m-1} e^{B_j'x} \tag{12}$$

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[3] To see how this model is derived refer to Maddala (1983), pp 34 -35.

B. DATA REQUIREMENTS

A number of variables were identified in chapter 2 that are required for this analysis. These included: size of land holdings; size of forest holdings; distance between the respondent's residence and his/her forest land; length of tenure; type of farm operation; ways in which the forest is used; age; and education. A variety of other information was also collected to facilitate further analysis if required.

Logit analysis requires that the dependent variable is a discrete variable that is a finite set, mutually exclusive, and exhaustive. Dependent variables were derived from questions that asked: whether the respondent had managed or harvested their forests in the past; whether they would consider timber management or harvests in the future; whether they would consider allowing someone else to manage or harvest their timber; and their preferences between a variety of timber contract characteristics.

C. DATA COLLECTION

The population for this study was identified as those persons who owned at least 40 acres of bush[4] within one quarter, or continuous between quarters, within 100 kilometres of Meadow Lake, Saskatchewan. A minimum bush requirement was

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[4] The term bush is frequently used in Saskatchewan to refer to private forests.

intended to reflect economies of scale associated with timber harvest; 40 acres was selected in accordance with the minimum bush requirement identified by Natural Resources Canada for inclusion in their private lands program. Mistik Management Ltd.[5] recommended a maximum distance of 100 kilometres from the mill site to reflect reasonable haul distances. Aerial photos were examined to identify land with adequate bush cover in the target area and these quarters were then cross matched to township maps to identify the owners of the bush area. Since available aerial photography for the region was taken between 1979 and 1982 some of the land had been cleared subsequent to the time the photos were taken.

The sample were surveyed using a personal interview format. More reliable results were expected through personal interviews than through mail questionnaires or telephone interviews because the survey asked detailed questions about inventory and future intentions. A total population of 1970 landowners was identified. A target of 100 interviews was set and 133 names were drawn randomly from the population to allow for a less than 100% response rate. In total, 89 persons were interviewed. Of the remaining population 16 had cleared their land and no longer met the minimum bush requirement; 8 had sold their land to others already included in the population; 8 could not be located; and 12 were not available for

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[5] Mistik Management Ltd. is the company that runs the woodlands divisions of the Millar Western Pulp Mill in Meadow Lake and Norsask Forest Products, a sawmill in Meadow Lake.

miscellaneous reasons.

The survey questionnaire was composed of three parts. Respondents were first asked to inventory their landholdings and farm operations. Part two contained questions pertaining to historical, current, and future intentions for forest usage and an assessment of the landowner's familiarity with woodlots. The third part allowed an investigation of the use of timber contracts. Landowners were asked to identify their preferences for a series of timber contract options, were then presented with four different contracting agencies and were asked if their preferences would change when dealing with the specified agency. The four agencies presented were a landowner organization, a forest products company, a government agency, and an independent contractor. A copy of the survey is included as the appendix.

D. ANALYTICAL PROCEDURES

Preliminary data analysis indicated that there was insufficient variation to run models to investigate the relationship between landowners' characteristics and their past timber management and harvesting activities. However, a number of logit models were developed to provide information on respondents' harvesting and management intentions. Responses to questions 14 and 15 (appendix) were used as the dependent variables in logit model specifications that analyzed

landowner characteristics thought to be possibly related to willingness to consider timber harvesting and management in the future. Questions 16 and 18 provided information, respectively, on whether the respondents would prefer to manage and harvest their forest land themselves or have someone else manage and harvest it for them. Responses to these questions were used as the dependent variables in logit model specifications that analyzed the relationship between landowner characteristics and willingness to consider a timber contract.

Multinomial logit models were used to try to identify landowners preferences among various timber contract characteristics. Models examined: preferences for method of payment by landowners for services received; preference for payment to landowners for timber sold; preferred contract duration; and the condition respondents wanted their land left in at the completion of the contract. There was insufficient variation in the data and these models did not produce significant results.

A number of variables were not significant and were removed from the final models. In some instances variables were left in the final models because, despite low significance, they had the expected sign, did not effect the other coefficients in the model, and improved the model's forecasting ability.

Several specification tests were used to assess the accuracy of the regressions.

Overall significance was assessed using a likelihood-ratio test and the percent predicted correct. Maddala's R-squared and McFadden's R-squared were also calculated. Variance decomposition analysis was used to test for collinearity.

CHAPTER 4: RESULTS

The results of this study suggest that there is significant interest in developing the private forest sector in Saskatchewan. Although only approximately one quarter of the respondents had harvested wood from their land in the past ten years, and less than 10% had sold timber, approximately half indicated that they would consider harvesting trees in the future. There was also considerable interest in timber contracts with approximately half of the respondents indicating they would consider a timber management or harvest contract in the future.

The landowners appeared to be well suited to developing the private forest sector in northwest Saskatchewan. The mean landholding was 800 acres and nearly 270 acres of this was bush land. Many of the landholders are likely to have some of the skills and equipment needed to meet this demand since three quarters of the respondents owned at least one tractor and nearly half were involved in two or more farm enterprises. A description of the summary statistics and preliminary results can be found in Salkie et al, 1993.

Logit models were developed to identify relationships between landowner characteristics and their preferences. Models identified characteristics that were related to landowners' willingness to consider forest management and harvest in the future and to the likelihood that they would consider a timber contract. The

variables included in the final models are defined in Table 1.

The results from logit models that regressed, respectively, the willingness to consider management and harvesting in the future on selected landowner characteristics are listed in Tables 2 and 3. The variables 'family' and 'uses' were, respectively, significantly negatively and positively correlated with the dependent variable in both models. The degree of diversification was positively correlated with willingness to consider managing timber stands. The area of trees owned was not a highly significant factor in willingness to consider management; however, it was left in the final model because it had the expected sign, did not effect the other coefficients, and improved the model's forecasting ability.

Tables 4 and 5 list, respectively, the results from logit regressions that examined the relationship between landowners' characteristics and their interest in considering timber management and timber harvest agreements. The area of trees owned and the level of farm diversification were significantly negatively correlated with consideration of a management contract. Willingness to consider a harvest contract was positively correlated with both the length of family tenure of the land and the age of the landowner. Past experience with a harvesting contractor was left in the model that analyzed willingness to consider a timber management contract because, although it was not highly significant, it improved the model's forecasting ability and did not effect the other coefficients in the model.

TABLE 1: Definition of variables used in logit models

Variable name	**Definition**
Age	Age of the respondent
Divers	# of different farm enterprises the respondent is involved in
Family	# of decades the respondent's family has owned at least one parcel of the current land base
Past	Dummy variable where 1 indicates that a contract was used for past harvesting activity
Trees	100's of acres of trees owned by respondent
Uses	The number of ways respondents use their forest land (consumptive and non-consumptive)

TABLE 2: Logit results of the impact of selected characteristics on a landowner's willingness to consider managing their forest land in the future.

Variable	Coefficient	Standard Error	ρ =
Constant	-0.87747	0.6651	0.18705
Family	-0.29031	0.1090	0.00773
Divers	0.4892	0.2818	0.08254
Uses	0.51946	0.1952	0.00780
Trees	0.13252	0.1126	0.23914

Percent predicted correct = 70%

TABLE 3: Logit results of the impact of selected characteristics on a landowner's willingness to consider harvesting from their forest land in the future.

Variable	Coefficient	Standard Error	ρ =
Constant	0.28607	0.5624	0.61098
Family	-0.21565	0.09784	0.02751
Uses	0.409252	0.1794	0.02257

Percent predicted correct = 64%

TABLE 4: Logit results of the impact of selected characteristics on a landowner's willingness to consider entering a timber management agreement in the future.

Variable	Coefficient	Standard Error	ρ =
Constant	1.0197	0.5082	0.04479
Trees	-0.35475	0.1375	0.00989
Divers	-0.45880	0.2653	0.08373
Past	0.44907	0.3691	0.22368

Percent predicted correct = 69%

TABLE 5: Logit results of the impact of selected characteristics on a landowner's willingness to consider entering a timber harvesting agreement in the future.

Variable	Coefficient	Standard Error	ρ =
Constant	-1.5541	0.8100	0.05503
Age	0.39772	0.1974	0.04394
Family	0.17442	0.1047	0.09559

Percent predicted correct = 69%

The survey was designed to elicit information that could be used in multinomial logit models to identify landowner preferences between various timber contract characteristics. However, there was insufficient variation in the data given the sample size, for these models to produce significant results. Summary statistics of the responses to these questions show some general preferences between contract characteristics and these results are presented in Tables 6 through 9. When presented with various agencies, respondents showed a general preference for landowner organizations as a managing agency and an independent contractor as a harvester. Over half of the respondents preferred to pay for management and/or harvesting services received through a crop share arrangement. Nearly 60% of the respondents favoured a contract duration of between 1 and 5 years. Over 60% of the respondents wanted their land to be left with young growth established at the end of the contract term. The strongest preference for payment method for timber sold was to receive a periodic land lease payment and be paid for the timber at the time of harvest; approximately 35% of the respondents favoured this payment method.

TABLE 6: Preference for contract duration.

Contract Length	Frequency	%
< 1 year	20	23.0
1 - 5 years	51	58.6
6 - 15 years	11	12.6
15 - 30 years	4	4.6
> 30 years	1	1.1
Missing Values	2	

TABLE 7: Preference for land condition at contract end

Land Condition	Frequency	%
Same Volume of Timber as at Contract Outset	11	12.9
No Regeneration	19	22.4
Young Growth Established	52	61.2
Condition of the Land is Not Important	3	3.5
Missing Values	4	

TABLE 8: Preferred payment option for management/harvesting services received

Option	Frequency	%
Cash for Services	26	29.9
Crop Share	45	51.7
Giving the Managing Agency an Option to Purchase	16	18.4
Missing Values	2	

TABLE 9: Preference for payment received for timber harvested.

Payment Method[1]	Frequency	%
Option 1	23	26.4
Option 2	5	5.7
Option 3	31	35.6
Option 4	11	12.6
Cash at time of harvest	17	19.5
Missing Values	2	

[1]The payment options were defined as:
Option 1:A contract in which they are paid for all standing timber initially and receive a periodic lease payment for the land throughout the contract period.
Option 2:A contract in which both land and timber are leased through a periodic payment.
Option 3:A contract in which the land is leased with a periodic payment and the timber is paid for at the time it is harvested.
Option 4:A contract in which a periodic payment is paid based on the average annual growth of timber. At the time of timber harvest adjustments are made for over or under payment.

CHAPTER 5: DISCUSSION AND IMPLICATIONS

Well developed markets for private timber do not exist in Saskatchewan. Some of the possible reasons that markets have not developed in the province include such things as: lack of demand; imbalance of market power between buyers and sellers; information exchange problems; and distortions resulting from land use policies.

New demand for aspen pulpwood in the northwest region of the province has created new interest in the potential of private woodlots to supply fibre to industrial forest companies. These companies may need to know if landowners are able to supply them with fibre over time in order to project suitable harvest schedules. Policy makers, eager to identify new opportunities for regional development, are interested in alternative policy options that could be used to encourage this development. It is important to identify landowners who may be interested in supplying timber and to evaluate alternative options that could be used to encourage sustainable forest management in order to develop appropriate policies and effective programs.

The purpose of this project is to provide some of this information. Four goals were identified for the study. These included: 1) to identify characteristics of landowners that have motivated them to manage and supply timber in the past; 2) to identify landowner characteristics that may be related to willingness to consider

timber management/harvest in the future; 3) to investigate the use of various contracts to encourage private forest management and sustainable timber harvesting; and 4) to consider the results of this analysis within the context of government policy and other factors that affect land use decisions. The first three objectives come out of the results of the analysis, however the fourth will be addressed in a more qualitative nature.

In order to address the first three objectives, data from the survey results were used to estimate a number of logit models. The results showed that there had been insufficient management and harvesting of private timber in the past to support analysis of historical activity. However, a number of landowner characteristics are associated with willingness to consider future timber management and harvesting, and willingness to consider a timber contract. Significant characteristics included: the diversity of farm operations; the length of family tenure of the land; the number of ways the respondents use their forest land; the area of forest owned; and the age of the respondent. However, no results were obtained from models intended to identify preferences for different contract characteristics due to insufficient variation in the responses.

A. DISCUSSION OF RESULTS

The analysis identified several landowner characteristics that were significantly

related to landowners preferences for timber management and harvest. However, several of the relationships did not concur with *a priori* expectations. In fact, some characteristics had opposite than expected signs. Some of the discrepancies between the results of this study and those from previous work may be due to sample size[6]. The small sample size may have resulted in some variables being insignificant in this study which may had been significant given a larger sample. However, a number of other factors could explain the deviations between expected and actual results. Some possible reasons are outlined below.

1. Willingness to consider future timber management and harvesting

Diversity was the only landowner characteristic that yielded the expected sign with regards to willingness to consider future timber management and harvesting; as expected, it was positively correlated to willingness to consider timber management. A number of variables were not significant in either model including: distance between residence and forest; age; and education. The variable 'family' had the opposite than expected sign and the expected relationship between ways in which the forest was used and future management and harvesting intentions was not observed.

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[6] Personal interviews were used to collect data thus our sample size was smaller than that of previous work.

Education level may not have been significant because formal measures of education were used. The grade level achieved may not accurately reflect respondents effective education level because in many areas of rural Saskatchewan formal education was only available until grade 8; beyond this level respondents either had to go away to school or pursue their education informally.

Saskatchewan is a large province and urban centres may be some distance from rural communities; this might alter the perception of distance in Saskatchewan. If people frequently drive long distances to shop and go to school, they may also be indifferent to driving to work on their forest land.

Forest area owned was likely not a significant factor in willingness to manage or harvest because the population was pre-defined as owners with at least forty acres of trees.

The variable 'family' was significantly negatively correlated to consideration of future harvest; this is contrary to work by Jamnick and Beckett (1988) in New Brunswick where length of family tenure was positively correlated to woodlot harvesting activity. This difference may result from the different ways in which private forests have historically been used in the two provinces. Jamnick and Beckett suggested that, as the length of family tenure increased, the likelihood of past harvesting activity also increased thus past precedent would encourage the

respondent to harvest their timber. Since little harvesting activity has taken place on private land in Saskatchewan historically, as the length of family tenure increased, the likelihood that the forest had been used for timber management and harvesting may not increase, rather the likelihood that the land had been used for alternative uses may increase. In the case of Saskatchewan, past precedent and experience suggest that landowners may be less likely to consider future harvest as length of family tenure increases. Although the two studies found opposite signs for the variable 'family', the logic and reasoning behind both results are the same.

The expected correlation between consumptive and non-consumptive forest uses and willingness to consider forest management and harvesting was not observed. The number of non-consumptive, consumptive, and total uses (consumptive and non-consumptive) of the forest were all positively correlated to willingness to consider forest management and harvesting, with the strongest correlation being with total number of uses. Respondents may consider private forests to be either waste land or a resource. These results suggest that those who have used the forest in any way consider it a resource and may consider managing or harvesting it. Those who have not used it in the past may not consider it a resource and may be unwilling to consider using it in the future.

2. Willingness to enter management and harvest contracts

The level of diversity of farm operations exhibited the expected negative correlation to willingness to let someone else manage the forest. Furthermore, age conformed to expectations and was positively correlated to willingness to consider letting someone else harvest timber stands. Other variables which did not yield the expected results included: the total area owned; area of trees owned; distance from residence to forest land; and length of family tenure,

The area of trees owned was negatively correlated to consideration of a management contract; however, neither the total area owned, or the area of trees owned, were significantly related to willingness to consider a harvest contract . The area of trees may not have been a significant factor in the willingness to consider a harvest contract because the population was restricted to those landholdings with more than forty acres of trees. A forty acre forest may be sufficient to justify a timber harvest contract but may be too small to meet larger economies of scale associated with forest management.

Distance was not a significant explanatory variable in willingness to consider timber management or harvest contracts. This may be due to cultural attitudes towards distance as described previously.

The length of family tenure conformed with *a priori* expectations and was positively correlated with willingness to consider a timber contract. However this was incongruous with the negative correlation observed between family and willingness to consider future timber management or harvest. This apparent discrepancy may be explained by the hypothetical nature of the question regarding willingness to enter a timber contract; landowners were asked to assume that they were considering timber management and harvesting. If, in the past, landowners had not been involved with these activities, their lack of experience may encourage them to enter into contracts for future timber management and harvesting, rather than conducting the operation themselves.

B. PRACTICAL IMPLICATIONS

A number of landowner characteristics were identified that are significantly related to landowner's interest in considering sustainable timber production in northwestern Saskatchewan. In interpreting these results it is important to note that they differed from woodlot studies that have been undertaken in other parts of North America. Variables such as distance and area of trees were not significant in these models and other variables, such as the length of family tenure, had opposite than expected signs. However, economic theory could be used to explain both these results and the results of previous studies.

The inconsistencies between this work and studies in other regions demonstrates the importance of not extrapolating results between regions. Economic decisions are made in a broad environment that includes: regional socio-demographic characteristics; the historical development of the region; landowner preferences; and the macro-environment within which decisions are made. These factors affect both economic analysis and interpretation.

Rural Saskatchewan developed differently than the Maritimes and many other regions of North America. Forestry is generally less important to Saskatchewan's economy. Furthermore, the level of non-industrial private forest ownership is lower than in many other areas that have developed non-industrial private forest sectors. In many of the regions with a developed woodlot sector, private forestry developed simultaneously with agriculture and industrial forestry. However, in northwestern Saskatchewan private forestry did not develop. New interest in a private woodlot sector is likely due to recent technological innovations that have resulted in Aspen becoming commercially valuable. These regional socio-demographic characteristics must be considered when evaluating relationships between landowner characteristics and economic decisions.

When developing policies and programs, policy makers should consider all factors that affect land use decisions. Government programs and subsidies can distort the environment within which decisions are made and, since government programs

vary across provinces, this is another reason not to extrapolate between regions. Analysis and interpretation of results should consider both current government programs and landowners' expectations about future programs.

C. LIMITATIONS OF THE STUDY AND SUGGESTIONS FOR FURTHER RESEARCH

A number of assumptions formed the basis of this study. These included the assumptions that: 40 acres of trees is a sufficient area to achieve economies of scale required to manage and harvest timber; that a reasonable haul distance is 100 kilometres; that all tree species can be lumped together; and that landowners have enough knowledge about their forests to provide informative answers to the questions.

Landowners with less than forty acres may be willing to manage and harvest timber in the future. New varieties of aspen may provide landowners with an opportunity to intensively manage small stands for profit. Some landowners may consider planting previously untreed areas to trees in the future. Forest belts may be used to produce timber. These opportunities suggest that future research should be conducted without restricting the population by forest size.

The assumption that 100 kilometres is a reasonable haul distance for aspen is

based on current economic conditions in the region. In other areas of the prairies 200 kilometre hauls are not unusual, as the demand for aspen changes, the definition of a reasonable haul distance in northwestern Saskatchewan may also change.

Future studies should consider the impact of tree species on both past management and harvesting activity, and on willingness to manage and harvest in the future. Markets for private softwood products are more developed than for hardwoods, yet new demand is primarily for hardwoods. Studies could investigate landowner characteristics that are associated with past management and harvesting of softwoods and assess whether the species mix affects respondent's interest in future timber management and harvesting.

This study did not investigate stand attributes including tree quality and volume. There is considerable variation in the stand attributes in the region and future studies should evaluate each landowner's resource and analyze the relationships between landowner preferences and the quality of their resource. To respond to these questions, landowners need to be knowledgable about their forest resource. Increasing interest in aspen stands, resulting from new demand by Mistik Management Ltd. for timber, may increase the general level of knowledge in the region.

This study only investigated timber contracts as a means of encouraging sustainable timber management on private land. Several other mechanisms could also be used. Further work is required to investigate landowner preferences for contract characteristics and contracting agency. Alternative mechanisms such as landowner organizations, marketing boards, and changes to the forest act should be investigated.

Some of the macro factors that affect private land forestry were identified but no analysis was conducted into the magnitude of their impact or options to correct commodity bias in policies. Further work is required to investigate the full impact that factors such as agricultural policy, taxation, and forest policy have on land use decisions.

Rural Saskatchewan and the farm culture are in transition. Although respondents typically were raised on a farm, less than 50% currently farm full-time and only 22.5% farm part-time. The average respondent was between 46 and 55 years old and had some high school education. As the land is taken over by younger people, the level of education and ownership objectives may also change. These changes may already be apparent from the decline in the number of respondents farming compared to the number that grew up on a farm, and the discrepancy between historical harvest levels and interest in future timber harvests.

As this transition occurs, government policy is also likely to change. The magnitude of current agricultural subsidy programs is unlikely to continue; increasing pressure from abroad, and concerns over government debt, may change the type and scope of assistance available to farmers. Agricultural policy should be reviewed to identify any land use bias that may result in inefficient allocation of private land resources.

It may also be appropriate to review the Saskatchewan Forest Act. The impact of tenure allocation and stumpage polices have been identified as possible impediments to private woodlots. Restructuring could prevent problems associated with monopsonies, lack of log markets, and information exchange.

Government policy may also have to be amended and developed to address a variety of issues that may arise from increases in woodlot harvesting activity associated with the development of Saskatchewan's aspen resource. The harvest of private forests will affect the environment through changes to total forest cover and water shed. Policy makers should investigate regulatory options that will facilitate the development of private timber markets while minimizing possible detrimental impacts.

The economic development of rural Saskatchewan is affected by a combination of cultural, technological, and current policy factors. If future policies are to further

social welfare they should consider all of these changes. The results of this study suggest there is potential for private woodlot development that may contribute to rural development.

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APPENDIX, SURVEY QUESTIONNAIRE

AN ECONOMIC ANALYSIS OF FACTORS INFLUENCING THE FOREST MANAGEMENT AND HARVESTING DECISIONS OF PRIVATE WOODLOT OWNERS IN NORTHWESTERN SASKATCHEWAN - A SURVEY[1]

LANDOWNER NAME(S):

TELEPHONE NUMBER:

ADDRESS:

I am surveying people in Northwestern Saskatchewan who own forested land as part of my thesis work towards a Masters of Science degree at the University of Alberta. This research is being funded through the Canada-Saskatchewan Partnership Agreement in Forestry.

This project is being undertaken because very little information is available on the use of private land for forestry. I hope that by finding out more about you and your woodlot I will be able to identify ways that may improve the opportunities for woodlot development.

The information I gather will be kept strictly confidential. I am interested in the aggregate results for the region, not individual results.

I'd like to begin by finding out about your land holdings.

OPERATIONS:

1. LAND HOLDINGS

How many acres do you own in total? _____

	1/4	Total Acres	Length of Ownership (years)	How Did You Obtain It (buy from family or other...)	How Long Has It Been In Your Family (years)	How Many Acres are Rented Out	Type of Rental Arrangement (crop share or cash lease)	Distance From Residence (miles)
Cultivated Area (Acres)								
Improved Pasture (Acres)								
Unimproved Pasture (Acres)								
Trees/Bush (Acres)								
Other (Acres)								

2. LAND LEASED

How many acres do you lease in total? _____

	1/4	Total Acres	How Long Have You Leased It (years)	How Long Is the Agreement For (years)	Is The Land Publicly or Privately Owned	Type of Rental Arrangement (Crop Share or Cash Lease)	Distance From Residence
Cultivated Acres							
Improved Pasture (Acres)							
Unimproved Pasture (Acres)							
Trees/Bush (Acres)							
Other (Acres)							

3. Have you purchased any land in the past ten years?

1. Yes ____

Quarter	Area	Year	Price	Land Type(s) (%)	Reason For Purchase

2. No ____

4. Have you sold any land in the past ten years?

1. Yes ____

Quarter	Area	Year	Price	Land Type(s) (%)	Reason For Sale

2. No ____

5. Do you have a farm operation?

1. Yes ____

What crops do you grow?

What livestock do you own?

None:
Cattle:
Pigs:
Chickens:
Other:

Do you participate in any government programs?

Yes ____, please specify:
No ____

2. No ____

6. What machinery do you own?

Equipment Size	Tractors (hp)	Combines	Trucks	Cultivators	Seeding Equipment	Haying Equipment	Silage Equipment	Other
Small								
Medium								
Large								

HARVESTING:

7. Have any trees been harvested, cleared or otherwise removed from your land in the past ten years?

1/4	Date	Area Or Volume and Species Harvested, Cleared, or Otherwise Removed	Who Harvested, Cleared, or Otherwise Removed	Was Financial Assistance Received For Completing These Activities (for eg. free information or government subsidy)		Reason For Harvest, Clearing or Removal	What Was The Timber Used For	Did You Sell The Timber	Land Use After Harvest
				What Assistance Was Provided	Who Provided The Assistance				

MANAGEMENT:

8. In the past ten years have you undertaken any forest management activities such as planting new areas, regenerating cleared areas, thinning, weeding, release work, or any other management activity?

1/4	Date	Area	Activities						Was assistance received for completing these activities		Reason for Management
			Plant	Regen.	Weeding	Thinning	Release Work	Other, Specify	What was Provided	Who Provided it	

9. Do you currently have a management plan for your woodlot?

1. Yes ____

Did you develop the management plan?

a. Yes ____, did you receive assistance in developing the plan?

b. No ____, who developed the management plan?

Did you receive financial assistance?

2. No ____

MOTIVATIONS

10. People acquire their forested lands for a number of different reasons ranging from owning the forested land because it is part of their primary residence to purchasing an area for recreation. What are the main reasons that you acquired your forested lands?

11. Forests can be used for a number of different functions ranging from aesthetic satisfaction to timber production. In what ways do you use your forested land?

    In what ways do others use your forested lands?

12. Do you perceive that there is a need for help with woodlot management?

    1. Yes ____

       What type of help do you perceive a need for?

       What type of organization would you want to deliver the assistance?

    2. No ____

13. Are you aware of any group associations interested in the development of private woodlots?

    1. Yes ____

       Which Ones?

       Do you belong to any such organization?

       Yes ____, Which one? _____

       No ____, Why not?

    2. No ____, Would you be interested in joining such an organization?

14. Would you consider harvesting timber from your forested land in the future?

1. Yes ____, what forest products would you consider selling?

Have you considered selling ...

Product	Volunteered	Prompted	
		Yes	No
Rails			
Posts			
Fuelwood			
Rough Lumber			
Value Added Lumber			
To Supply a Forest Products Company			
Christmas Trees			
Ornamentals			
Other, _____			

2. No ____, why not?

Do you know of markets for forest products that can be produced on your forested land?
a. Yes ____, for what products are their markets?

Are you aware of markets for ...

Product	Volunteered	Prompted	
		Yes	No
Rails			
Posts			
Fuelwood			
Rough Lumber			
Value Added Lumber			
To Supply a Forest Products Company			
Christmas Trees			
Ornamentals			
Other, _____			

b. No ____

Have you considered products such as

Product	Yes	No
Rails		
Posts		
Fuelwood		
Rough Lumber		
Value Added Lumber		
To Supply a Forest Products Company		
Christmas Trees		
Ornamentals		
Other, _____		

15. Would you consider managing the timber on your forested land in the future?

1. Yes ____, what objectives would you manage for?

What activities would you consider undertaking?

Have you considered ... ?

Activity	Volunteered	Prompted	
		Yes	No
Planting previously untreed areas			
Regeneration of harvested or cleared areas			
Weeding			
Thinning			
Release Work			
Other, _____ _____			

CONTRACTS AND OPTIONS

In answering the following questions please assume that a market exists for your timber.

16.1 If you were considering woodlot management would you manage it yourself or would you consider having someone else manage it for you?

1. Themselves
2. Someone else
3. Both
4. Neither

16.2 Would you reconsider this management arrangement if the second party was a(n):

1. government agency, Yes ___ No ___
2. forest products company, Yes ___ No ___
3. independent contractor, Yes ___ No ___
4. landowner organization, Yes ___ No ___

17.1 If you were considering developing a management plan for your forested land would you prefer to prepare your own management plan or have someone else prepare it for you?

1. Themselves
2. Someone else
3. Both
4. Neither

17.2 Would you reconsider the preparation of your management plan if the second party was a(n):

1. independent contractor, Yes ___ No ___
2. government agency, Yes ___ No ___
3. landowner organization, Yes ___ No ___
4. forest products company, Yes ___ No ___

18.1 If you were considering harvesting timber from your forested land would you prefer to harvest it yourself or have someone else harvest for you?

1. Themselves
2. Someone else
3. Both
4. Neither

18.2 Would you reconsider your harvest arrangements if the second party was a(n):

1. forest products company, Yes ___ No ___
2. government agency, Yes ___ No ___
3. landowner organization, Yes ___ No ___
4. independent contractor, Yes ___ No ___

19.1 This card lists several different payment options that could be used by you to pay for harvesting and/or management services, please select the method you would prefer.

1. Cash for services
2. A crop share arrangement for timber harvested
3. Giving the managing agency an option to purchase wood
4. Other, please specify _____

19.2 Would your preference change if the second party was a(an):

	Yes	No	New Selection			
			1	2	3	4
Forest Products Company						
Landowner Organization						
Independent Contractor						
Government Agency						

20.1 This card list several different time period for which a harvesting and/or management agreement could be in effect. Please select the time period that you would prefer.

1. Less than one year
2. 1 year to 5 years
3. 6 years to 15 years
4. 16 years to 30 years
5. Over 30 years

20.2 Would your preference change if the second party was a:

	Yes	No	New Selection				
			1	2	3	4	5
Landowner Organization							
Independent Contractor							
Forest Products Company							
Government Agency							

21.1 This card describes five different types of cash payment options you could receive for timber from your woodlot. Please select the option that you prefer.

1. You enter into a contract and are paid for all standing timber initially and receive a periodic lease payment for the land throughout the contract period.

2. You enter into a contract in which both land and timber are leased through a periodic payment.

3. You enter into a contract in which the land is leased with a periodic payment and the timber is paid for at the time it is harvested.

4. You enter into a contract and receive a periodic payment based on the average annual growth of timber. At the time of timber harvest adjustment are made for over or under payment.

5. Other, please specify _____

21.2 Would your preference change if the second party was a(an):

	Yes	No	New Selection			
			1	2	3	4
Independent Contractor						
Landowner Organization						
Forest Products Company						
Government Agency						

22. This card describes different conditions in which the land could be left following a contract term. Please select the option that you prefer.

1. The land is returned with the same volume of timber as it had at the outset of the contract.
2. The land is returned following harvesting without regeneration.
3. The land is returned with young growth established.
4. The condition of the land following a contract is not important to me.

PERSONAL INFORMATION:

Finally I would like to find out more about the demographics of woodlot owners. The next few questions are designed for this purpose. All the results of this survey will be pooled and your individual answers will not be used in the research. Your individual responses to these questions, as with your responses to the entire survey, are confidential.

23. Could you please select the appropriate age bracket from this card.

1. Under 25
2. 26 - 35
3. 36 - 45
4. 46 - 55
5. 56 - 65
6. Over 65

24. Were you raised on a farm?

1. Yes ____

2. No ____, what was the approximate population of the area in which you were raised?

a. In a town of under 200

b. In a town of 201 to 500

c. In a town of 501 to 1 000

d. In a town of 1 001 to 5 000

e. In a town of 5 001 to 10 000

f. In a city of 10 001 to 50 000

g. In a city over 50 000

25. What is the highest level of education that you have received?

26. This card lists several income brackets; please select the bracket that best represents your household income before taxes.

A. $0 - $4,999	F. $25,000 - $29,999	K. $50,000 - $59,999
B. $5,000 - $9,999	G. $30,000 - $34,999	L. $60,000 - $69,999
C. $10,000 - $14,999	H. $35,000 - $39,999	M. $70,000 - $79,999
D. $15,000 - $19,999	I. $40,000 - $44,999	N. $80,000 -$99,999
E. $20,000 - $24,999	J. $45,000 - $49,999	O. Over $100,000

27. What percentage of your income is derived from your land? _____

28. What percentage of your income is derived from your woodlot? _____

29. What is your occupation? _____

(options: unemployed, student, retired, professional, self-employed, trade, sales, other)

Thankyou!!